produce a lower overall rate of return. As a result, the more modest debt ratio used by Dr. Vander Weide actually benefits cable.

Dr. Vander Weide's use of this same sample of cable operators to compute a fair cost of debt of 7.8% is likewise reasonable. This figure is slightly lower than the industry-wide average -- which is approximately 9% using Compustat data for all cable firms. But that industry-wide figure is skewed by the inclusion of a few outliers with an inordinately high cost of debt. As a result, the cost of debt computed by Dr. Vander Weide is more representative of the cost of debt for cable operators generally, and a higher figure would unjustifiably allow the overwhelming majority of cable operators to earn a rate of return based on a cost of debt that exceeds what they actually pay.

Cable's attack on the S&P Industrials as a surrogate for determining the industry's cost of equity misses the mark.[52] Although cable's monopoly position in its local markets results in a much lower <u>business</u> risk than that experienced by the S&P Industrials or by telcos, Dr. Vander Weide acknowledges that cable's high leverage makes it, from a <u>financial</u> standpoint, a somewhat riskier investment than the average S&P Industrials company. The third quartile of the S&P

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52 NCTA at 22-24; Viacom at 45; Tele-Media at 18-19; Cablevision Industries at 38; CATA at 63-64; Cablevision Systems at 33-34.

Industrials is a fair surrogate given cable's relatively lower level of business risk and higher financial risk.[53]

In fact, cable's own arguments confirm that Dr. Vander Weide's use of the third quartile is appropriate. Cable claims it is entitled to a much higher rate of return than that earned by the average S&P company because cable has a higher than average beta.[54] According to cable's own analysis, however, the average beta for cable companies is approximately 1.3,[55] while Compustat calculates the average beta for companies in the third quartile of the S&P Industrials to be approximately 1.2. Thus, the cable comments themselves confirm the accuracy of Dr. Vander Weide's analysis.

4. Cable's Depreciation Rules Should Be Similar to Those for Telcos

In CC Docket No. 92-296, the Commission is currently considering streamlining the procedures for oversight of depreciation in the telephone industry. We believe that the Commission should adopt the Price Cap Carrier option in that proceeding, under which the Commission would monitor the depreciation rates selected by each company to ensure that they comport with generally accepted accounting principles. If the

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53 Vander Weide Aff. ¶¶ 19-20.

54 Pitsch Communications at 15-18; Cablevision Industries at 41-42 (and accompanying Brattle Group analysis); AUS Consultants at 12-15 (attached to Comcast Comments); AUS Consultants at 70-74 (attached to Cable Operators Comments).

55 See AUS Consultants Exhibit 1 (attached to Comcast Comments); AUS Consultants Attachment 2 (attached to Cable Operators Comments).

Commission follows that course, we believe that the same monitoring method may properly be used to govern cable companies, as many of them urge in their comments.[56] By the same token, if the Commission chooses a more restrictive method of regulating depreciation for telephone companies, the same method should be applied to cable.[57]

The cable industry's objections to the Commission's proposal to prescribe depreciation rates provide no justification for differential treatment of cable and telephone companies. Cable cites the heterogeneity within the industry with respect to factors such as age and type of equipment as reasons for the Commission to refrain from prescribing depreciation rates,[58] but comparable differences exist among telephone companies. If the Commission decides in CC Docket No. 92-296, despite these considerations, to regulate depreciation in the telephone industry more intensively than under the Price Cap Carrier option, it should do the same for cable.

Significantly, cable does not dispute the Commission's conclusion that the selection of a rapid

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[56] NCTA at 25; Cablevision Systems at 35; Cablevision Industries at 46-47; Medium-Sized Operators at 22; TWE at 25-26; Tele-Media at 10-11; Continental at 87-88.

[57] As the Commission has explained, differences among depreciation rates have significant consequences for cost-of-service ratemaking. In particular, accelerated depreciation has the effect of increasing subscriber rates and generating additional up-front income for the cable operator. NPRM ¶ 26.

[58] NCTA at 26; TCI at 28-29; Cablevision Systems at 36; TWE at 25-26; Tele-Media at 10.

depreciation rate can substantially improve the cash flow that will be permitted an operator following a cost-of-service proceeding. If cable operators are permitted to select rapid depreciation rates while telephone companies are forced to apply rates prescribed by the Commission, cable operators will secure a significant competitive advantage. Indeed, with the increased convergence of the technology and equipment being deployed by both industries,[59] it is particularly important to adopt parallel depreciation rules for the two industries.[60] Disparate regulation of depreciation methods would yield the indefensible result of having the <u>same types of equipment</u> subject to different depreciation rates -- one prescribed by the Commission for telephone companies and one freely chosen by cable companies for ratemaking purposes in order to obtain an artificial competitive advantage.

5. The Commission Should Apply the Same Price Cap Mechanism to Cable That It Applies to Telcos

The Commission has correctly concluded that price caps are preferable to cost-of-service proceedings as a means of regulating cable rates. Once initial cable rates are established -- regardless of whether they are set by reference to the benchmark or after a cost-of-service proceeding -- the

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[59] The cable industry itself highlights this phenomenon, noting that it has been replacing coaxial cable with fiber in order to perform "non-video functions." NCTA at 26.

[60] As we noted in our initial comments, moreover, just as changes in depreciation rates do not produce a change in service prices under the telco price cap rules, changes in depreciation rates for cable assets should be treated as exogenous and should not translate into service price changes.

Commission should impose a workable and comprehensive price cap regime to govern future rate adjustments. Those operators that elect to invoke the cost-of-service option will have to go through the process only once to establish a reasonable starting point. Thereafter, they will have their rates set in the same manner as the operators that had their initial rates set by the benchmarks. By eliminating the burden of recurring cost-of-service proceedings, this approach most effectively streamlines the rate regulation process and allows the Commission and local regulators to conserve their resources while discharging their statutory responsibilities.

The price cap mechanism should emulate the one that governs telcos. To the extent that telcos remain subject to a productivity offset, cable's price caps should reflect a comparable offset. Similarly, although we believe that a pure price cap regime would effectively balance consumer and investor interests, the current price cap regime governing telcos includes a sharing obligation. It would be competitively harmful and unjustifiable as a matter of law for the Commission to adopt a more generous framework of pure price caps for cable while continuing to subject telcos to the additional limitations of the current regime.

Cable advances no convincing justification for exempting its price caps from a productivity offset while such an offset remains in place for telcos. Cable argues broadly that it is already operating at close to peak productivity because it has been in an unregulated environment.[61] But cable ignores the Congressional finding that it has been exercising monopoly power for many years, with neither regulatory constraints on its prices nor competitive prods to improve its productivity.

Cable also raises two more specific objections to the use of a productivity offset, arguing that historical productivity trends are not sufficiently predictive to support a future productivity offset[62] and that the GNP-PI already takes account of increased productivity in the general economy and therefore eliminates the need for any additional offset.[63] These same objections, however, were considered and rejected by the Commission in its order establishing price caps for the telephone industry.[64] The Commission cannot turn around now and refuse to impose a productivity offset for cable based on these objections if it perpetuates the restraints currently in place in the telephone price cap system.

Moreover, cable is in the midst of implementing new technologies and, to an increasing degree, the converging telephone and cable industries are deploying the <u>same</u> technologies. There is no basis for assuming that these

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[61] TWE at 48; NCTA at 31-32; TCI at 69; Continental at 90-91.

[62] NCTA at 33; Cablevision Systems at 41; Comments of Discovery Communications, Inc. (Discovery) at 6-7.

[63] NCTA at 33; TWE at 43; TCI at 70; Discovery at 6; Viacom at 61; Cablevision Industries at 60.

[64] <u>Policy and Rules Concerning Rates for Dominant Carriers</u>, 5 FCC Rcd 6786, 6796 ¶¶ 74-78 (1990).

similar technological advances produce productivity gains for telcos but not for cable operators.[65] Indeed, if anything, cable has far more room for productivity gains than do telcos because the telephone industry has already improved its productivity considerably after a decade of increasingly intense competition and three years of price caps that have included a productivity offset.

Ultimately, cable cannot seriously maintain that it lacks the ability to achieve productivity gains in the coming years.[66] Rather, its position is that it should be entitled to retain the full benefit of any gains, while telcos must reduce their rates in real, inflation-adjusted terms every year. There is no reason for such disparate treatment, which will unnecessarily and unjustly harm the ability of telephone companies to compete with cable in either arena. The Commission should resist cable's efforts to obtain a competitive advantage and instead hold cable to the same kind of price cap regime that applies to telcos.

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[65] See NPRM ¶ 85 n.99.

[66] See, e.g., Cable Operators at 92 (remarking that "cable operators have more than enough incentive to gain efficiencies").

CONCLUSION

To fulfill its statutory responsibility to ensure reasonable cable rates, and to allow market forces rather than artificial regulatory advantages to dictate the competitive outcome between the converging cable and telephone industries, the Commission must frame its cost-of-service rules for cable in a manner that closely parallels the rules historically applied to telephone companies.

Respectfully submitted,

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Attorneys for the Pacific Companies

September 14, 1993

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of Implementation of Sections of the Cable Television Consumer Protection Act of 1992 Rate Regulation	)))))))	MM Docket No. 93-215

AFFIDAVIT OF EDWARD A. WALVICK

STATE OF NEW YORK)
) ss.:
COUNTY OF WESTCHESTER)

I, Dr. Edward A. Walvick, being duly sworn, depose and say:

1. I am the Executive Director of NYNEX Science and Technology, Inc., responsible for Transmission and Video Systems. My organization supplies transmission support for the NYNEX Telephone Companies, and for NYNEX CableComms.

2. I submit the attached report on Cable Television and Telephony - A Convergence of Technology, in support of Bell Atlantic, NYNEX and Pacific Bell's Reply in the above-referenced matter.

Dr. Edward A. Walvick
Dr. Edward A. Walvick

Sworn to before me this
13th day of September, 1993

Susan J. Petretti
Notary Public
SUSAN J. PETRETTI
Notary Public, State of New York
No. 01PE4996375
Qualified in Putnam County
Term Expires May 18, 1994

Re: Cable Television and Telephony - A Convergence of Technology

1.0 INTRODUCTION

This paper describes the access technologies used to deliver telephone service and cable television to residential premises. We show how the technologies used for the plant between the telephone company central office and the customer premises and between CATV company headend and the customer premises have evolved from being quite distinct to where they are virtually indistinguisable. Further, we discuss trends which will make the technologies for the two industries in fact identical.

2.0 TELEPHONE PLANT EVOLUTION

The plant between the customer's premises and the first telephone company building is called loop plant. When the telephone was first invented, this plant consisted of either two metallic wires or one wire with a ground return. Open wire plant gave way to twisted pair copper plant (with as many as 4000 pairs in a single cable) in the 1930s and 1940s. Designs based on twisted pairs were standard until the mid 1970s. Carrier systems based on conditioned copper plant appeared in the late 1970s, to be replaced with fiber systems in the early 1980s. The following sections describe each of the major steps in the evolution. (Note that this discussion is limited to loop plant, although much the same evolution took place in interoffice, or trunk plant, at a somewhat faster pace.)

2.1 OPEN WIRE

The first designs were based on the experience gained in building telegraph systems. They consisted of one wire and a return ground path. These become quite noisy as the number of customers grow, and were quickly replaced by two wire circuits. Since the direct current used to power the telephone instrument traveled down one wire and returned on the other, the two wires formed a loop through the telephone. This is the origin of the term loop plant where each telephone line required two wires. Pictures of early plant show downtown streets shaded by telephone poles carrying hundreds of wires. To control noise and crosstalk (the leakage of one conversation onto another loop) the wires were periodically transposed. This is shown in Figure 1. Transpositions occurred at spacings of hundreds of feet.

2. TWISTED PAIRS

Congestion and the eventually inability to add more pairs on the poles led to the invention of twisted pair cable plant. Each wire was insulated, initially with paper (pulp cable). Later polyethylene insulated cable (PIC) was used. Crosstalk was controlled by twisting each pair every inch or so. Varying twist lengths were used to avoid having pairs accidentally twist in tandem. Cables eventually were designed with up to 4000 pairs.

The two limiting factors in loop plant design were DC resistance and signal attenuation. The resistance limit was determine by the ability of the central office equipment to sense on-hook (an open loop) and off-hook (a closed loop). Typical limits were between 1200 and 1500 ohms. To assure that the appropriate resistance limit was not exceeded and to minimize contrast between short and long loops, plant was designed with mixes of 26 gauge (the finest), 22-gauge, 19 gauge and 16 gauge copper wire. Short loops were built with the finer gauges and long loops with the coarser gauges.

The concern over attenuation was addressed by the use of load coils. Attenuation increases with frequency. The telephone network is designed to transmit from almost DC (zero Hertz) to 3000 Hertz (Hz). Load coils tend to sacrifice loss over 3000 Hz for minimizing loss between 0 and 3000 Hz. Figure 2 shows typical attenuation curves for plain twisted pair and for twisted pairs with 88mh loading every 6000 feet.

Generally speaking, this design was acceptable to 18 thousand feet (kilofeet or kft), with loading used for loops longer than 15 kft. Beyond 18 kft range extension (additional direct current) or range extension with gain was required.

Some terminology that will be useful later on is:
Feeder Plant - The first portion of the plant leading out of the central office. While not universally so, this plant was usually in large (1000+ pair) cables, and placed in duct(i.e., hollow pipes buried in trenches in advance of the need for new cable).

Distribution Plant - The feeder would be split into distribution cables once the cable reached residential neighborhoods. Again, while not universally so, this was generally 300 pair or less and frequently aerial (on poles) or directly buried (without ducts).

Drop - The final portion of plant leading from the distribution cable to homes. These were generally spliced into cables (using terminal boxes) for groups of several to a few dozen lines. Two or more pairs were usually brought to each home.

The picture which emerges is of a tree structure (wide trunk-like feeder, narrower branch-like distribution and thin twig-like drops). Because the uncertainty of growth increases as we move from the populous center to the fringes, planning periods were typically one to three years for feeder, three to five for distribution and "ultimate" for drop.

2.3 CARRIER SYSTEMS

The same twisted pair cables were used for interoffice plant as well. Because of the longer distances between offices than between the serving central office and the customer premises, electronic amplifiers (repeaters) were generally needed to make signals intelligible for calls between cities. (As an aside, the word repeater originally referred to human operators who were bridged onto the call at a point between the two parties and repeated the conversation when the parties could not understand each other.) The cost of the electronics drove the development of trunk carrier systems in the 1950's and 1960's. This technology moved to loop plant much later. The first loop carriers appeared in the mid to late 1960's.

The early systems used modulation techniques to add additional voice channels in the frequency spectrum above 3000 Hz on copper without load coils. Second line carrier systems derived a second line (usually for the same customer) on a single twisted pair. Other systems used a pair for each direction and derived from four to twenty four voice channels on the two pairs. The first digital systems appeared in the 1970's. They derived about 100 lines on four copper pairs (with additional pairs used for protection). The justification for the use of carrier might be one of the following:

1. Duct congestion - all of the available ducts were occupied and duct relief was too costly or was impossible (there was no space for new duct).

2. Held orders - The time required for plant relief (new cable) would result in too many unfulfilled (held) orders for service. Carrier could be used for quick service, and removed when the new plant was available.

3. Cost - it was less expensive to install carrier than to install new cable.

Over time, the cost of copper cable increased and the cost of electronics decreased. Thus, the reason for installing carrier became cost and indeed carrier was more frequently the chosen alternative.

Figure 3A shows the design of a copper based loop carrier system. In the 1980's, fiber carrier appeared in the interoffice plant where cross sections were at least a few hundred circuits. Finally, in the late 1980s, fiber began to move to loop plant. Figure 3B shows a fiber-base optical digital loop carrier (ODLC) system. For both, the economics of carrier becomes more attractive as the distance between the Central Office Terminal (COT) and Remote Terminal (RT) increases and the number of circuits in the cross section gets to be a few hundred. Modern carrier design places the RT to within 12 kft of customers. Indeed, it almost never makes sense anymore to place new copper cable in the feeder portion of loop plant.

Loop carrier was the design of choice until the last year or so. While loop carrier (particularly optical digital loop carrier - ODLC) is still the economic choice in many situations , fiber to the curb is emerging as the preferred design.

2.4 FIBER TO THE CURB (FTTC)

Modern ODLC serves hundreds of customers from an RT. Newer FTTC systems, serve from 8 to a few dozen customers from their Optical Network Units (ONUs), thus getting fiber closer to the customer. Figure 4 shows a typical FTTC design.

A single Host Digital Terminal (HDT) can serve several ONUs which are each within a few hundred feet of the customer's premises. FTTC thus replaces both feeder and distribution plant. FTTC is becoming the design of choice for almost all new build situations.

3.0 CABLE TELEVISION DESIGN

The original Cable Television (CATV) designs used coaxial cable with repeaters (similar to then current L-carrier designs used in telephone interoffice plant). A single coaxial cable would leave the headend (perhaps one cable in each of the cardinal directions) and through branching and taps, serve several thousand customers. To keep up the signal strength, repeaters or amplifiers were utilized. Depending on the number of taps and the gauge of the coax, repeaters could be required on the order of every thousand feet. Long cascades of amplifiers were common and individual customers could have as many as 40 or so amplifiers between their premises and the headend. This is shown in Figure 5.

Several factors have led to the introduction of fiber into the CATV design of the last three or so years.

1. Reliability - If a customer was at the end of a long cascade of amplifiers, a failure of one would cause an outage. Similarly, the failure of a amplifier near the headend would cause the loss of signal to hundreds of customers.

2. Noise - Each active device in cascade introduces noise resulting in degradation of the signal. Long cascades resulted in increased noise levels and thus poor signal quality at the end.

3. Cost - As in the case of the telephone company changeover to carrier systems, the current least cost CATV design uses fiber deep into the plant and to within reach of a few hundred customers.

Figure 6 shows a CATV fiber design. Fiber goes from the Headend to the neighborhood. Over time, as technology develops, the economic number of customers to serve from the AM node has dropped from a few thousand to several hundred today. Note the similarities between the ODLC design (fig. 3B) and CATV Fiber (fig. 6).

4.0 JOINT PLANT - THE NYNEX CABLECOMMS EXPERIENCE

NYNEX is currently the largest cable company in the UK, with franchises totalling over 2.5 million homes. We began building about two years ago and took advantage of the similarities noted above. Our headends are also telephone central offices. All services leave the building on fiber distribution facilities. In our current builds, we use fiber for CATV to 2400 home nodes then coax is used to 600 home distribution nodes (with amplifiers) and finally coax is taken to 64 home block nodes. For telephone, the fibers parallel the CATV fiber and coax through the 2400 home node to the 600 home nodes. From there, 50 pair cables are used to the same block node. The drop is a cable that combines a thin coax with a sheath containing two twisted pair. We call it a siamese drop (because it consists of two sheath joined in the middle).

In our 1994 builds, we expect to take fiber to the distribution nodes (400-600 homes) for both services.

5.0 NEWER TRENDS

Both newer technologies and newer services are pushing the technologies even closer.

5.1 NEW SERVICES

In the CATV industry, the trend has driven from the early capture of off the air signals in community antenna television (the actual original definition of CATV) for a small number of channels to modern systems that carry a hundred or so channels. This has driven fiber closer to customers already, since the cost of amplified coax increases exponentially with the required bandwidth.

In the telephone industry, fiber has already been driven close to customers because the bandwidth needed for the aggregation of many digitized 3000 Hz voice signals, for a large number of customers, is large as well.

Both industries are looking to even more bandwidth intensive services; be it multimedia telephone calls or hundreds of channels of television. Eventually both industries are moving towards individual switched full motion video connections to each customer premises.

5.2 VIDEO COMPRESSION

The trend that makes the growth of bandwidth demand manageable is video compression. American standard NTSC television requires 6MHz analog. When digitized it requires up to 150 Mbps (uncompressed). Commercial broadcasters already use 45 Mbps compression. The new compression work being done under the auspices of the International Standards Organization (ISO) goes under the acronym MPEG (Motion Picture Experts Group). VCR quality is possible at about 1.5 Mbps and CATV quality (at its best) is doable at about 4 Mbps.

5.3 INTEGRATED DIGITAL FIBER TO THE CURB

Integrated Digital provides both telephone and CATV using the same configuration as FTTC (Figure 4). There maybe more fibers required and both a coax and twisted pair drop (or a siamese drop) are needed. In one example, three 45 Mbps television signals from a possible 128 are sent on the coax. When video compression is introduced, this sytem will have the capacity for several addressable channels for each customer premises.

5.4 FIBER/COAX

The configuration for Fiber/Coax is identical to that for CATV fiber (Figure 6). The coax to the home carriers both telephone and a CATV signal. They are separated by electronics in each customer premises. In the initial design, CATV is carried in the same format as for CATV only systems while telephone is modulated into approximately 50 MHz bands above and below CATV. Soon, video compression will be used to increase channel capacity from several hundred to several thousand thereby enabling individual switched channels to each customer premises.

6.0 ECONOMIC IMPLICATIONS

NYNEX has recently sent requests for information in both the UK and US for loop technology. In each case, FTTC and fiber/coax appear quite promising. Indeed, it appears that we can build plant with either technology for either telephone only, or telephone plus CATV for much less than our embedded design for telephone alone costs. Since we have not conducted a true request for quote we cannot quote specific prices, but less than $500 per home appears feasible for both telephone and video.

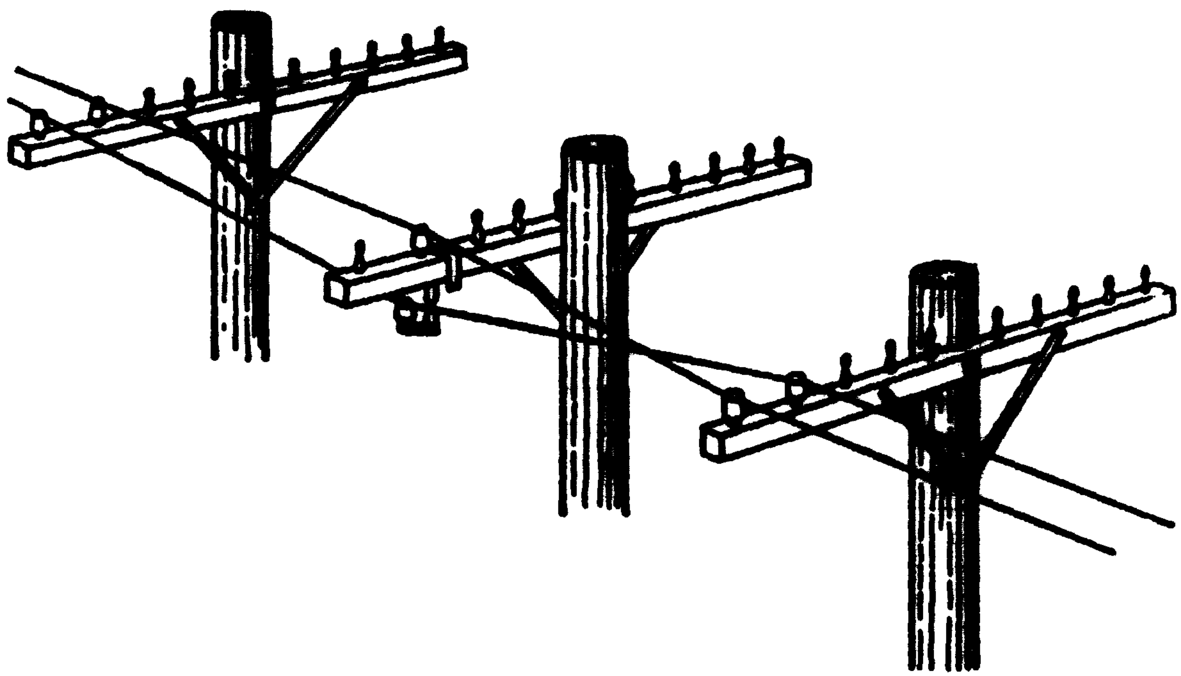

Figure 1 - Open Wire Transpositions

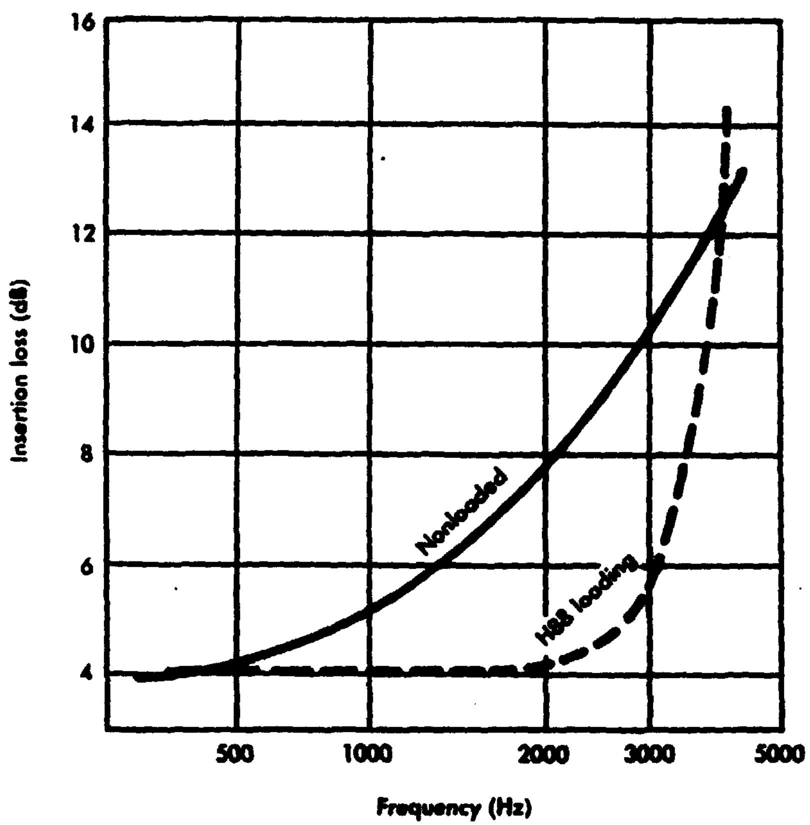

Figure 2 - Attenuation Curves

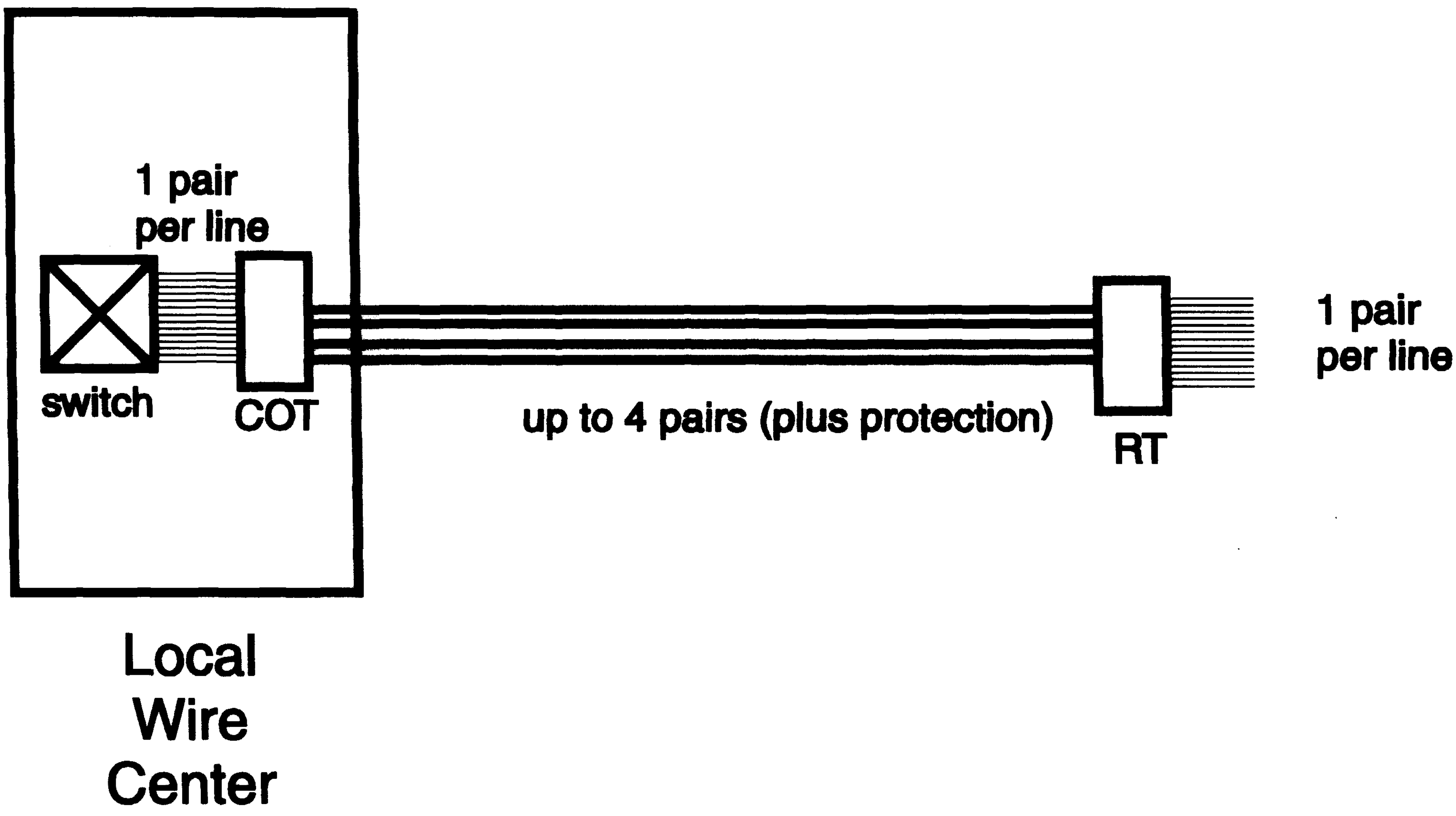

Figure 3A - Loop Carrier

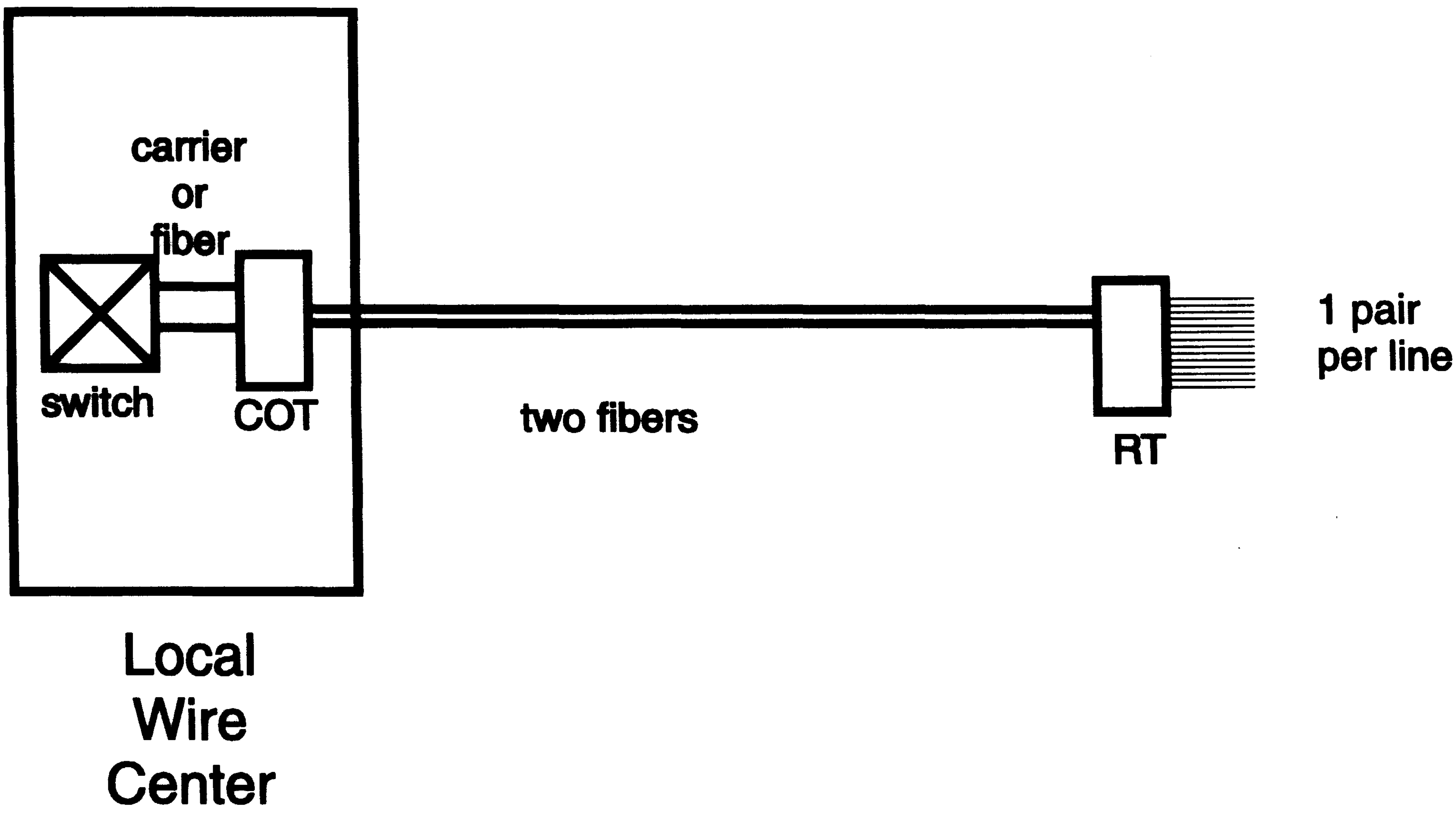

Figure 3B - Optical Digital Loop Carrier

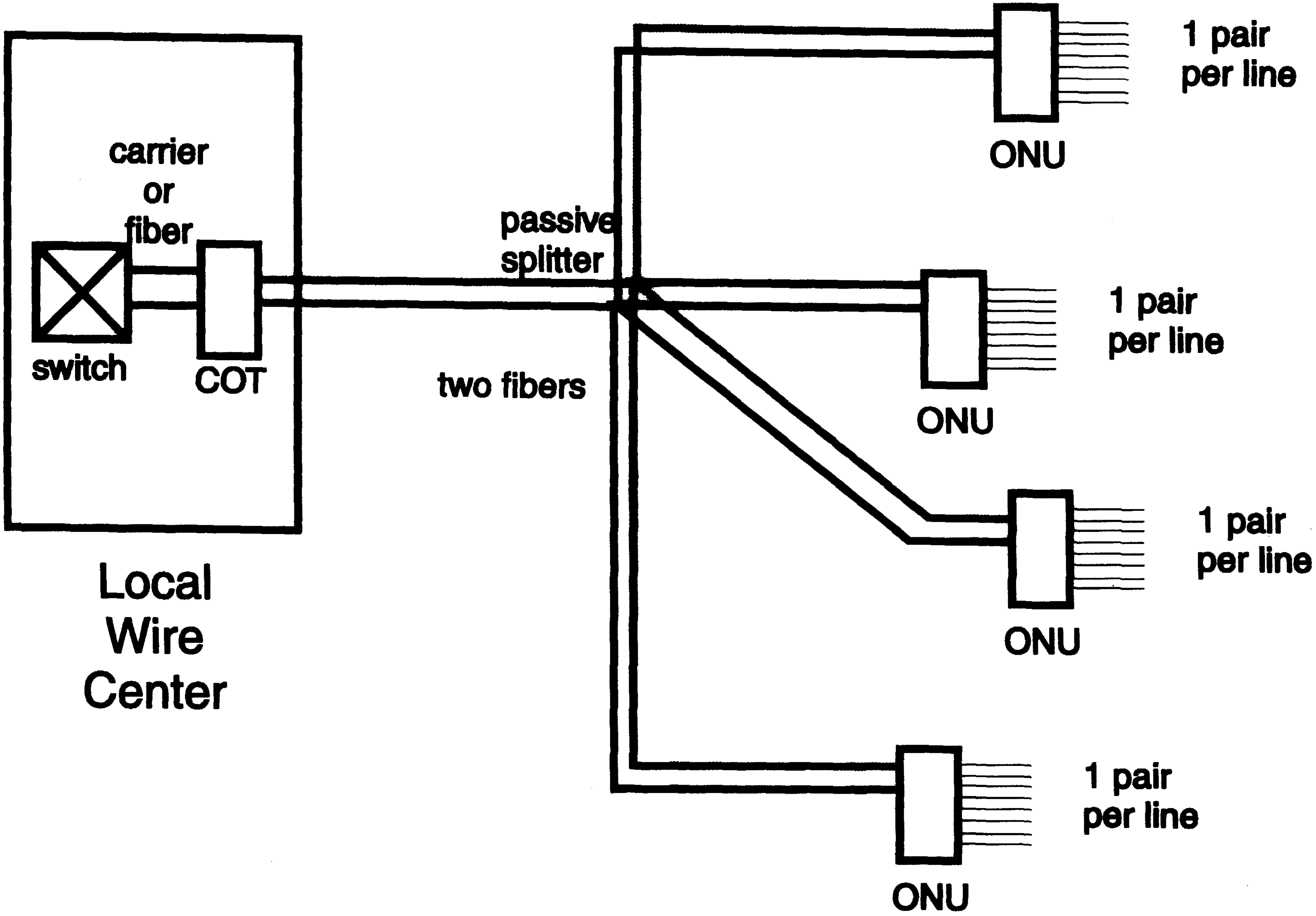

Figure 4 - Fiber to the Curb

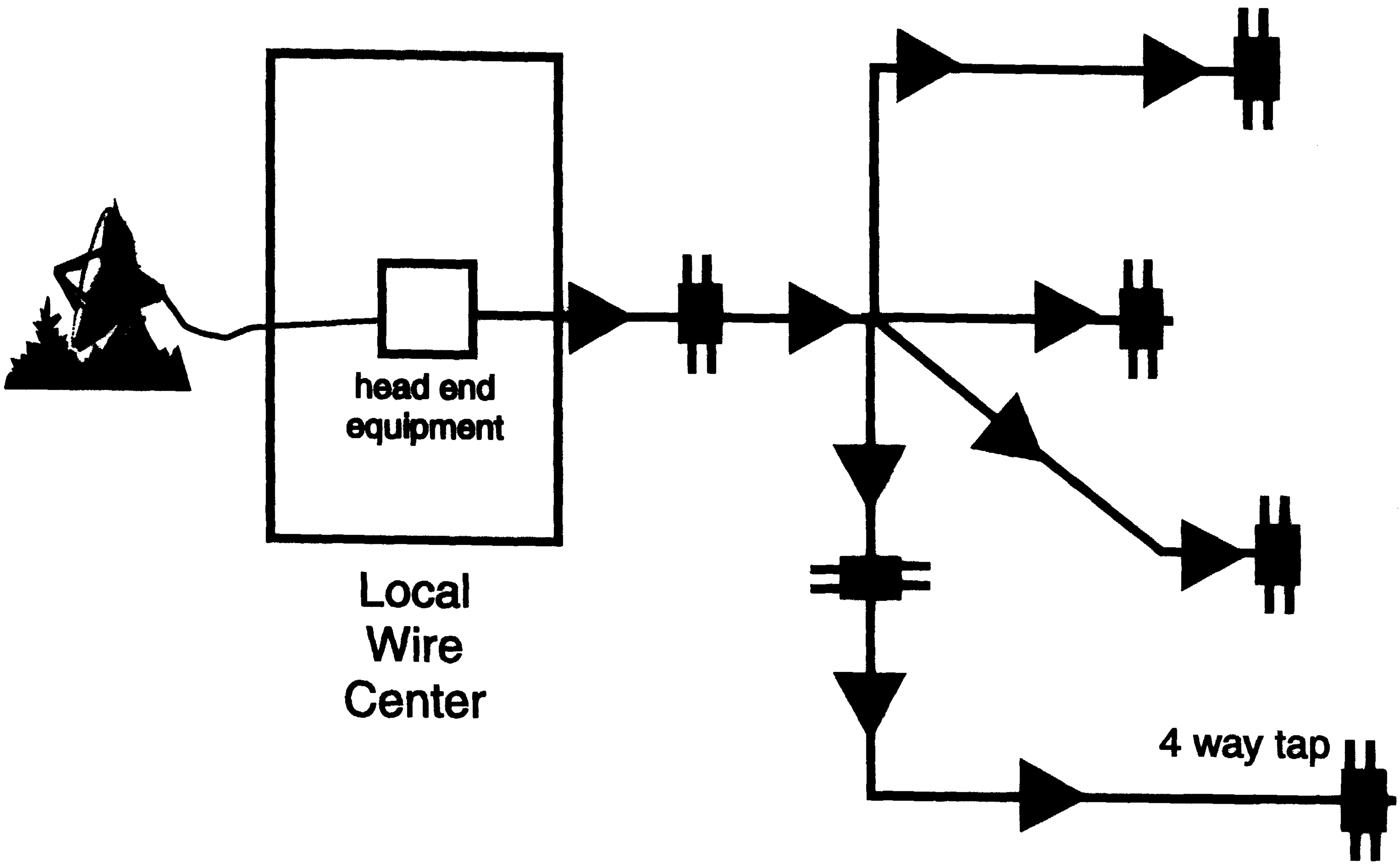

Figure 5 - Coax Tree and Branch

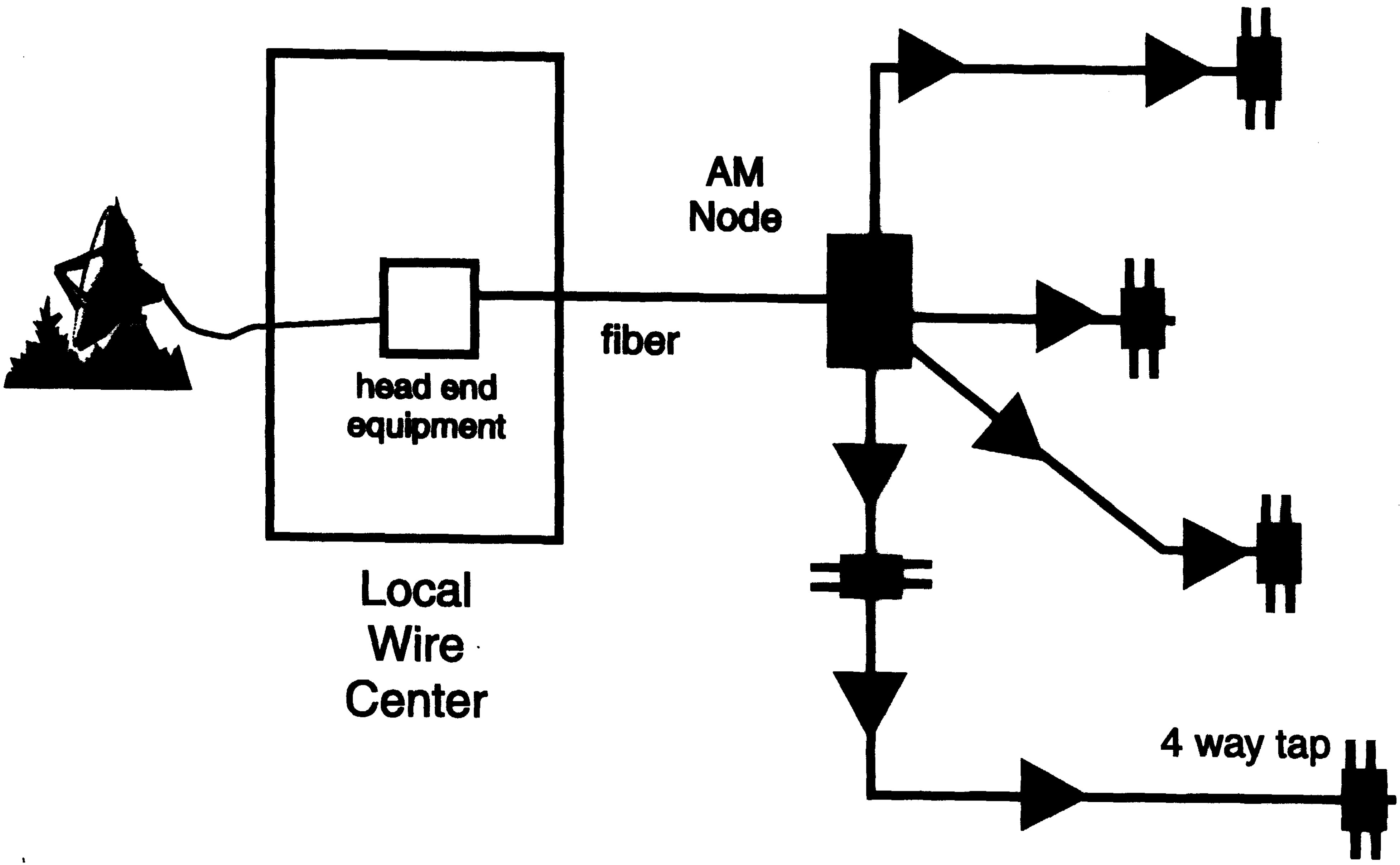

Figure 6 - CATV Fiber Design

THE GEODESIC NETWORK II:

1993 REPORT ON COMPETITION IN THE TELEPHONE INDUSTRY

Peter W. Huber, Michael K. Kellogg, and John Thorne

Cable Television

The CAPs offer two way fiber-optic capabilities; cable TV operators remain the dominant providers of one-way broadband local transport.[180] Traditional telco copper twisted-pair wires can only carry voice and data at low capacity (4 KHz), the coaxial cables used by cable companies have a vastly higher capacity (1 GHz).[181] A single, full television channel devoted to data transmission can carry about 5,000,000 bits per second, or about 500 times the rate at which data is transmitted via a high-speed modem in a fax machine. Cable companies typically offer anywhere from 6 to 150 channels of video programming.[182]

The industry has developed explosively in the decade since the Bell breakup was announced. In 1982 the cable industry had less than 30 million subscribers,[183] and passed only 49.5 million homes.[184] The impact of the 1978 Pole Attachment Act was only just beginning to be felt; the cable industry was still handicapped by inconsistent state and federal regulation that persisted until the enactment of the Cable Act of 1984, immediately after divestiture.[185] Today, cable lines pass 88 million homes representing 96 percent of all television households (90 percent of all households) in the United States, and some 62 percent of those households (54.5

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[180]George Gilder, *Cable's Secret Weapon*, FORBES, Apr. 13, 1992, at 80.

[181]One industry participant has stated that "[c]omparing the two wires is like comparing a five-car ferry with an eight-lane bridge." *Quoted in id.* at 81.

[182]The following chart shows the distribution of channel capacity of cable systems as of January 1992:

Channel Capacity	% of Systems	Basic Systems	Subs	% of Subs
54 or more	979	9	14,402,254	28
30-53	5,509	51	32,408,601	64
20-29	1,315	12	2,686,074	5
13-19	311	3	155,187	0.3
6-12	923	9	480,150	1

CABLEVISION, May 4, 1992, at 20 (National Cable Television Association figures).

[183]NCTA, CABLE TELEVISION DEVELOPMENTS 2-A (May 1992).

[184]NCTA (citing Paul Kagan Assoc., Cable Television Investor Newsletter (Nov. 21, 1990)).

[185]Cable Communications Policy Act of 1984, Pub. L. No. 98-549, 98 Stat. 2789 (1984), *codified in* 47 U.S.C.A. §§ 521-559 (West Supp. 1991).

million) actually subscribe to cable service.[186] TCI, the largest cable company, controls cable access to over 10 million subscribers.[187] By most assessments, cable companies enjoy a considerable degree of market power in their own service area.[188]

The cable industry is now moving fast toward two-way capabilities and a head-on challenge to the telephone's hegemony in two-way communications.[189] Cable companies are replacing their "tree and branch" networks with "star" configurations that use the more efficient fiber optic lines to connect the cable head-end to a neighborhood node, and coaxial cable to serve the homes themselves.[190] **FIGURE 2.2.** Interactive cable television is already a functioning reality in a number of U.S. test markets,[191] and is available to 200,000 subscribers in Canada and the United

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[186]NCTA, CABLE TELEVISION DEVELOPMENTS 1-A (May 1992).

[187]*Id.* at 14-A.

[188]Most cable franchises face no competition within their service areas from other cable providers. Of the approximately 10,000 cable systems in the U.S., only about 60 communities have head-to-head cable competition. Justice Department economists attribute 40 to 50 percent of the rise in price of cable service since deregulation to the exercise of market power. R. Rubinovitz, Dep't of Justice, ECONOMIC ANALYSIS GROUP DISCUSSION PAPER, EAG 91-8, MARKET POWER AND PRICE INCREASES FOR BASIC CABLE SERVICE SINCE DEREGULATION 2 (Aug. 6, 1991).

In the handful of communities that allow head-to-head cable competition, basic rates are one third lower than elsewhere. Affidavit of Thomas W. Hazlett at 8, United States v. Western Elec. Co., Inc., No. 82-0192 (Jan. 9, 1991).

[189]G. Gilder, *Cable's Secret Weapon*, FORBES, Apr. 13, 1992, at 80.

[190]*Id.* at 80-81.

[191]GTE is testing its Main Street package of electronic transaction services in Cerritos, CA with an initial base of at least 150 customers. Main Street provides interactive shopping, educational, civic, information and entertainment services. S. Applebaum, *Interactive Cable Services Close to National Launches*, CABLEVISION, May 21, 1990, at 16. H. Schlossberg, *Interactive TV Forges Ahead*, MARKETING NEWS, Oct. 28, 1991.

Interactive Network Inc., a Mountain View, California, firm that has tested its programming in 200 cable homes in Sacramento, California, has attracted investments from a number of media companies, including NBC, Cablevision Systems and A. C. Nielsen Co. C. Moosakis, *Which Way for Two-Way*, CABLEVISION, Aug. 27, 1990, at 17.

ACTV Inc., owned by New York advertising agency, McCann Erickson, recently completed a test of its programming-based service to cable subscribers in Springfield, Massachusetts and is raising $100 million for a national cable-delivered service in which ACTV would be paired with the Canadian Videoway. C. Moosakis, *Which Way for Two-Way*, CABLEVISION, Aug. 27, 1990; ACTV technology employs four cable channels, decoder boxes with semiconductor chips and tuners to provide seamless switching from the company to the viewers' remote controls. K. Harris, *MTV Whiz Jumps from Hyperactive to Interactive*, L.A. TIMES, June 7, 1992, at D1. Interactive Network's trial service began